Reviewer’s report

Title: Hop tests and psychological PROs provide a demanding and clinician-friendly RTS assessment of patients after ACL reconstruction, a registry study

Version: 0 Date: 16 Mar 2020

Reviewer: Brooke Patterson

Reviewer's report:

We commend the authors on their study, on their ability to collect strength, function and PROs from 320 ACLR patients. To have these three key outcomes is a notable strength of the study, particularly the evaluation of psychological outcomes after ACLR and important message related to their inclusion in RTS assessment batteries. The key elements required for an observational cross-sectional study are reported, but the manuscript requires moderate revisions to be considered for publication. The key areas of attention relate to i) more detail in the introduction ii) increasing clarity of a-priori study aims iii) minor additional detail in the methods iv) linking the results of the study to the concluding statement v) improving clarity of figures, vi) linking results of current study to previous RTS battery pass rates. Please see specific comments below:

ABSTRACT

Background: Abbreviate RTS in second sentence when it first appears

Background: First and third sentence: ACL abbreviation - should this be ACLR? Psychological outcomes 1 year after "ACL" does not make sense so either change to ACLR or write ACL injury.

Background/Methods: Suggest changing muscle function to "physical function" to describe the strength and hop tests overall. Up to authors but preference would be to describe "muscle function" as the knee extensor and knee flexor strength testing, and hop tests as "hop-tests or 2 hops. This will also enable you to be very clear and more succinct when describing different results for these distinctly. And avoid the reader having to think back to what was the 2 MF and what was the 5 MF tests. You also refer to the 2 MF tests as 2 hop tests at times anyway, and this needs to be consistent throughout.

Results: Passing rates needs to be defined in methods. You have only used 230 of 350 words so would also see if you can include detail on the different test batteries. I.e. this could be done in results and just describe pass rate for the four different test batteries. 2 hops (XX%), 5 MF (XX%), 2 hops and 2 PROs (XX%), and 5 MF and 2 PROs (XX%).

Results: Discourage use of + in scientific writing to indicate and

Results: "lowest passing rates" - give a number
Results: "There was a very strong correlation between passing 2 hop tests + 2 PROs and passing 5 MF tests as well as passing 5 MF tests +2 PROs." This is a very confusing sentence, for the second part of the sentence, it is unclear if you are referring to a correlation between 5 MF tests and 2 PROs, or (2 hops + 2 PROs) and (5 MF tests). It would help if the statistical comparisons were defined in the Methods. OR Suggest breaking this sentence into two or providing r-values in brackets to break it up. Also, the first comparison - 2 hop tests + 2 PROs and passing 5 MF tests does not make sense - as the 2 hop tests are part of the 5 MF tests? Now I have read the results in the manuscript

Conclusion: Try to repeat the results to provide context for your statement of "demanding" I am still not sure on the term demanding, and the conclusion as a whole. Perhaps something along the lines of the following would highlight your results and tie into this message better. Otherwise, anyone could have made the statement hop tests with PROs provides a clinician friendly demanding test battery without doing the study.

47% passed the hop-tests, but when combined with the other 3 MF tests, and PROs, only XX% passed the entire battery. Therefore, clinicians should utilise a combination of PROs and different tests of physical function (i.e. strength and hop testing) to determine readiness for RTS.

INTRODUCTION:
The authors have constructed a concise introduction outlining the key elements of a RTS test battery. However, more detail is required.
Reference to clinical practice guidelines (Andrade BJSM 2019 review of six CPGs) recommend use of psychological measures (in two of the CPGs). But… few studies have evaluated psychological outcomes as part of RTS battery…. OF those that have… reference to previous RTS criteria test batteries or cohorts that have used physical function and PROs, and their associated "pass rates."
And why do we care apart from RTS outcomes? ?? what other consequences could failing physical and psychological criteria have for future outcomes (??symptoms, OA)

Line 51: "A proper assessment of MF after ACL injury and reconstruction should comprise measures of quadriceps and hamstring strength as well as measures of functional performance.[5]"
Please give an example of functional performance (e.g. hop tests) to provide context and lead into the tests of physical function in the current study

Line 54: Are references 6 and 7 specific to ACL injury? One reference about sports injury psychological response/assessment and one to two references specific to knee or ACL injury would be good here. Would suggest reading Truong BJSM 2020 scoping review (Psychological, social and contextual factors across recovery stages following a sport-related knee injury: a scoping review)

Line 58-59: It is, however, unknown if adding an assessment of psychological outcome to MF tests will give a better base for decisions on RTS. What is meant by a "better base"? Would a better phrase be "result in different pass rates?" Is this what your hypothesis is?
Line 60-61 (Aims). In relation to above comment; what are you evaluating? Pass rates. I would be more explicit with aim and hypothesis, in defining the "different RTS test batteries". I.e. was to evaluate the pass rate of a physical function RTS test battery with and without the inclusion of psychological outcome measures. Now having read the whole paper it is clear the two aims are to compare the pass rates, and to determine the correlation between the different batteries. Try to define this is in the aims.

Without reading the methods, you may also need to justify that the KOOS QoL is a psychological outcome measure? And if you cannot do so then the aims may need to change slightly as well.

METHODS:
General comment: Were the physical function tests and PROs administered by different assessors? If so, specifics around inter-rater reliability should be referenced in the methods.

Hop tests sections: Please provide more detail on the specifics of hop tests so the reader does not have to hunt through the reference. Is the vertical hop, vertical jump height based on contact time if hands were behind the back? Readers may not be familiar with the tests. E.g. side hop over 40cm line with aim to get as many repetitions as possible.

Test Batteries: Please provide rationale of why the different combinations of test batteries were chosen? Were these a-priori? Why not include the side hop test with the other hop tests if the rationale was based on clinician-friendly (i.e. access to isokinetic testing)

PROs: Rationale for categorising KOOS-QoL as a psychological outcome measure is required? This seems to be referred to generally as psychological outcome at points throughout the manuscript.

Definition of passing: KOOS-QoL 62.5 seems very low for young adults. Did you consider using any other cut-offs from within the literature? I.e. Ingelsrud AJSM 2016 paper?

RESULTS:
Line 143 - 162: Are the p-values all < 0.001 for each statistical comparison? If not please state actual p-values for each comparison.

Figure 2: It is unclear what the Asterix are evaluating the relationship between from just looking at the figure. Especially as the Asterix are not placed directly on the bars. Would advise putting it next to the figures in the table below, and indicate in legend that * = significant relationship compared to 2 MF tests (if this is true / but I am unsure if my interpretation is correct).

Figure 3: It is also unclear on Figure 3 what the * is evaluating. The definition is good in the legend. However, each one * appears to refer to two comparisons if my interpretation is correct? Again, would suggest putting it next to the numbers on the table below.

Correlation section: Be consistent with decimal places in text versus in Table 4.
DISCUSSION

Line 179-180: Interestingly, there was a very strong correlation[24] between the two different test batteries. I am not sure this is interesting given that 2 of the MF tests in one battery are incorporated into the battery with 5 MF tests? I agree with the point, if the two batteries (2 hops and 2 PROs result in reduced passing rate compared with 5MF) then clinicians should use the 2 hops and 2 PROs over 5 MF tests. What would be a better correlation to argue this point is if the 2 hops tests correlated with the 3 strength tests, therefore could say that hop tests are correlated and good substitute if no access to isokinetic testing.

Line 182: The results are comparable or even better than a comprehensive battery of 5 MF tests (strength and hop).

What does this mean? Comparable to what? What does better than mean?

Line 185: …which indicates that the use of only MF tests or only psychological outcomes is likely insufficient as RTS criteria.

This is an important point and should perhaps be linked back in to paragraph 4 (Line 202), it is the fact that your results demonstrate low psychological readiness and knee related QoL, but it is also that results demonstrate PROs aren't correlated to the MF tests. This further highlights the need to evaluate them both, and treat the appropriate deficits.

Line 192: are 29% and 13% listed in the wrong order? I.e. 13% passed with PROs

Line 200: "….need to better prepare patients in order to make a safe RTS."

How does this compare to other cohorts evaluating pass rates at 1-year post-ACLR? Explore what need to better prepare patients means in 1 sentence. I.e. increase duration to achieve? Increase utilisation of evidence-based rehabilitation?

Line 214: However, the use of both the KOOS QoL and the ACL-RSI led to more patients being identified as not "recovered" compared with using only MF tests.

Indicate that refers to the results of the current study

Line 217:

How might psychological profiles be related to other outcomes other than RTS? I.e. symptoms, function, future physical activity levels, weight gain?

CONCLUSION: Please refer to comments raised in the Abstract Conclusion.

Need to clearly link results of the study to the concluding statement. Otherwise, anyone could have made the statement hop tests with PROs provides a clinician friendly demanding test battery without doing the study.

Thoughts / suggestions below:

47% passed the hop-tests, but when combined with the other 3 MF tests, and PROs, only XX% passed the entire battery. The MF tests were not strongly correlated with PROs. Therefore,
clinicians should utilise a combination of patient-reported psychological and QoL outcomes, as well as tests of physical function (i.e. strength and hop testing) to determine readiness for RTS. Hop testing was moderately correlated with strength testing, and can provide a clinician friendly substitute was isokinetic testing

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

No

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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Please indicate the quality of language in the manuscript:

Needs some language corrections before being published

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